

WHAT IS CLAIMED IS:

1. A CPP giant magnetoresistive head comprising:
lower and upper shield layers with a predetermined
5 shield distance therebetween; and
a giant magnetoresistive element disposed between the
upper and lower shield layers and comprising a pinned
magnetic layer, a free magnetic layer and a nonmagnetic layer
disposed between the pinned magnetic layer and the free
10 magnetic layer, a current flowing perpendicularly to the film
plane of the giant magnetoresistive element,
wherein the pinned magnetic layer extends to the rear of
the nonmagnetic layer and the free magnetic layer in the
height direction, and the dimension of the pinned magnetic
15 layer in the height direction is larger than that in the
track width direction.
2. The CPP giant magnetoresistive head according to
claim 1, wherein the pinned magnetic layer comprises a
20 magnetic material having a positive magnetostriction constant
or a magnetic material having high coercive force, and the
end of the pinned magnetic layer exposed at a surface facing
a recording medium.
- 25 3. The CPP giant magnetoresistive head according to
claim 1, wherein the pinned magnetic layer has a laminated
ferrimagnetic structure comprising a first pinned magnetic
layer and a second pinned magnetic layer which are laminated

with a nonmagnetic intermediate layer disposed therebetween,
and the pinned magnetic layer partially or entirely comprises
Fe-Co-Cu (wherein Fe > 10 atomic percent, Co > 30 atomic
percent, and Cu > 5 atomic percent), Fe-Co-Cu-X (wherein X is
5 at least one element of Pt, Pd, Mn, Si, Au, and Ag), or
Co₂MnY (wherein Y is at least one element of Ge, Si, Sn, and
Al).

4. The CPP giant magnetoresistive head according to
10 claim 1, further comprising an antiferromagnetic layer
provided in the rear of the giant magnetoresistive element in
the height direction, for pinning the magnetization direction
of the pinned magnetic layer in the height direction.

15 5. The CPP giant magnetoresistive head according to
claim 4, wherein the antiferromagnetic layer is an insulating
antiferromagnetic layer comprising Ni-O or α -Fe₂O₃,

6. The CPP giant magnetoresistive head according to
20 claim 4, wherein the antiferromagnetic layer comprises an
insulating antiferromagnetic comprising Ni-O or α -Fe₂O₃ and
an antiferromagnetic metal layer interposed between the
insulating antiferromagnetic layer and the pinned magnetic
layer.

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7. The CPP giant magnetoresistive head according to
claim 1, further comprising large-area nonmagnetic metal
films provided between the giant magnetoresistive element and

the lower shield layer and between the giant magnetoresistive element and the upper shield layer, respectively, so that the large-area nonmagnetic metal films are in direct contact with the pinned magnetic layer and the free magnetic layer and
5 have larger areas than those of the pinned magnetic layer and the free magnetic layer, respectively.

8. The CPP giant magnetoresistive head according to claim 7, wherein the large-area nonmagnetic metal film
10 disposed between the giant magnetoresistive element and the lower shield layer comprises any one of Ta/Cu, Ta/Ru/Cu, Ta/Cr, Ta/Ni-Cr, Ta/(Ni-Fe)-Cr, and Cr, and when the composition contains Cr, the Cr content exceeds 20 atomic percent.

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9. A CPP giant magnetoresistive head comprising;
lower and upper shield layers with a predetermined shield distance therebetween; and

a giant magnetoresistive element disposed between the
20 upper and lower shield layers and comprising a pinned magnetic layer, a free magnetic layer and a nonmagnetic layer disposed between the pinned magnetic layer and the free magnetic layer, a current flowing perpendicularly to the film plane of the giant magnetoresistive element;

25 wherein the pinned magnetic layer comprises a magnetic material having a positive magnetostriction constant or a magnetic material having high coercive force, and the end of the pinned magnetic layer is exposed at a surface facing a

recording medium.

10. The CPP giant magnetoresistive head according to claim 9, wherein the dimension of the pinned magnetic layer
5 in the height direction is larger than the dimension in the track width direction.

11. The CPP giant magnetoresistive head according to claim 9, wherein the pinned magnetic layer has a laminated
10 ferrimagnetic structure comprising a first pinned magnetic layer and a second pinned magnetic layer which are laminated with a nonmagnetic intermediate layer disposed therebetween, and the pinned magnetic layer partially or entirely comprises Fe-Co-Cu (wherein Fe > 10 atomic percent, Co > 30 atomic
15 percent, and Cu > 5 atomic percent), Fe-Co-Cu-X (wherein X is at least one element of Pt, Pd, Mn, Si, Au, and Ag), or Co₂MnY (wherein Y is at least one element of Ge, Si, Sn, and Al).

20 12. The CPP giant magnetoresistive head according to claim 9, further comprising an antiferromagnetic layer provided in the rear of the giant magnetoresistive element in the height direction, for pinning the magnetization direction of the pinned magnetic layer in the height direction.

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13. The CPP giant magnetoresistive head according to claim 12, wherein the antiferromagnetic layer is an insulating antiferromagnetic layer comprising Ni-O or α -Fe₂O₃.

14. The CPP giant magnetoresistive head according to claim 12, wherein the antiferromagnetic layer comprises an insulating antiferromagnetic comprising Ni-O or α -Fe₂O₃ and
5 an antiferromagnetic metal layer interposed between the insulating antiferromagnetic layer and the pinned magnetic layer.

15. The CPP giant magnetoresistive head according to
10 claim 9, further comprising large-area nonmagnetic metal films provided between the giant magnetoresistive element and the lower shield layer and between the giant magnetoresistive element and the upper shield layer, respectively, so that the large-area nonmagnetic metal films are in direct contact with
15 the pinned magnetic layer and the free magnetic layer and have larger areas than those of the pinned magnetic layer and the free magnetic layer, respectively.

16. The CPP giant magnetoresistive head according to
20 claim 15, wherein the large-area nonmagnetic metal film disposed between the giant magnetoresistive element and the lower shield layer comprises any one of Ta/Cu, Ta/Ru/Cu, Ta/Cr, Ta/Ni-Cr, Ta/(Ni-Fe)-Cr, and Cr, and when the composition contains Cr, the Cr content exceeds 20 atomic
25 percent.